Executive Summary

ES-1 Introduction

In April 1994, the U.S. Environmental Protection Agency (EPA) issued the final national Combined Sewer Overflow (CSO) Control Policy *(59 Federal Register 18688)*. This policy established a comprehensive national strategy to ensure that municipalities, permitting authorities, water quality standards authorities, and the public engage in a coordinated planning effort to develop and implement cost-effective CSO controls that ultimately meet appropriate environmental and public health objectives. The policy is implemented through the National Pollutant Discharge Elimination System (NPDES) permit program under the provisions of the Clean Water Act. The State of Indiana published a final Indiana CSO Strategy in May 1996 that defines more specifically the implementation of the EPA CSO policy by municipalities in Indiana.

Under the State of Indiana's final CSO Strategy, CSO communities are required through the NPDES permit process to develop and submit to the Indiana Department of Environmental Management (IDEM) an operational plan for sewer system optimization to reduce CSO impacts. The operational plan objectives are to identify opportunities to minimize CSO impacts by means of sewer system operation and maintenance, advanced wastewater treatment (AWT) plant operations, and implementation of low-cost structural modifications to the system of interceptor sewers and diversion structures that collect wastewater from the combined sewer system.

Although not required to do so by its NPDES permits, the City of Indianapolis submitted its first CSO Operational Plan to the IDEM in December 1995. Prior to submittal of that plan, the city had instituted a number of programs and studies to address and evaluate the CSO system in Indianapolis. Among the more significant results of this work are a computer model of Indianapolis' combined interceptor sewer system and a computer model of the receiving streams in Indianapolis. In addition, as a result of the modeling efforts, both early action projects and other more complex projects have been planned and constructed in the system to reduce CSO impacts.

As a result of these ongoing studies of the combined sewer system, several reports, including the April 30, 2001, draft *CSO Long-Term Control Plan and Water Quality Improvement Report*, have been developed.

On January 1, 1998, the City of Indianapolis Department of Public Works (DPW) entered into two 10-year contracts with the White River Environmental Partnership (WREP) as co-permittee for the operation and maintenance of the city's storm and wastewater collection system, AWT facilities and the Eagle Creek dam. Under this contract, the city retains ownership of the storm and wastewater infrastructure and AWT facilities, but utilizes a contractor for operation and maintenance of the facilities.

The city also develops a written Collection System Maintenance Plan on an annual basis. This work plan sets the yearly goals for the contract operator on sewer system operation, cleaning, and inspection. This document also includes the Standard Operating Procedures needed for operation and maintenance of the sewer system.

The CSO Operational Plan is intended to be a dynamic plan that is updated regularly in response to both regulatory changes and the implementation of new facilities. The city's 1995 CSO Operational Plan has been updated in this document to reflect the improvements made in the Indianapolis combined sewer system since 1995 and to indicate the strategy for the future.

ES-2 Description of the Indianapolis Sewer System

According to the 2000 census, the City of Indianapolis, located in Marion County, had a population of approximately 860,000 people, making it the 12th largest city in the United States. The wastewater collection system managed by the Indianapolis Department of Public Works (DPW) serves almost the entire population of Marion County, as well as several outlying areas. This service area includes a combined sewer area of approximately 54.8 square miles of tributary area, the

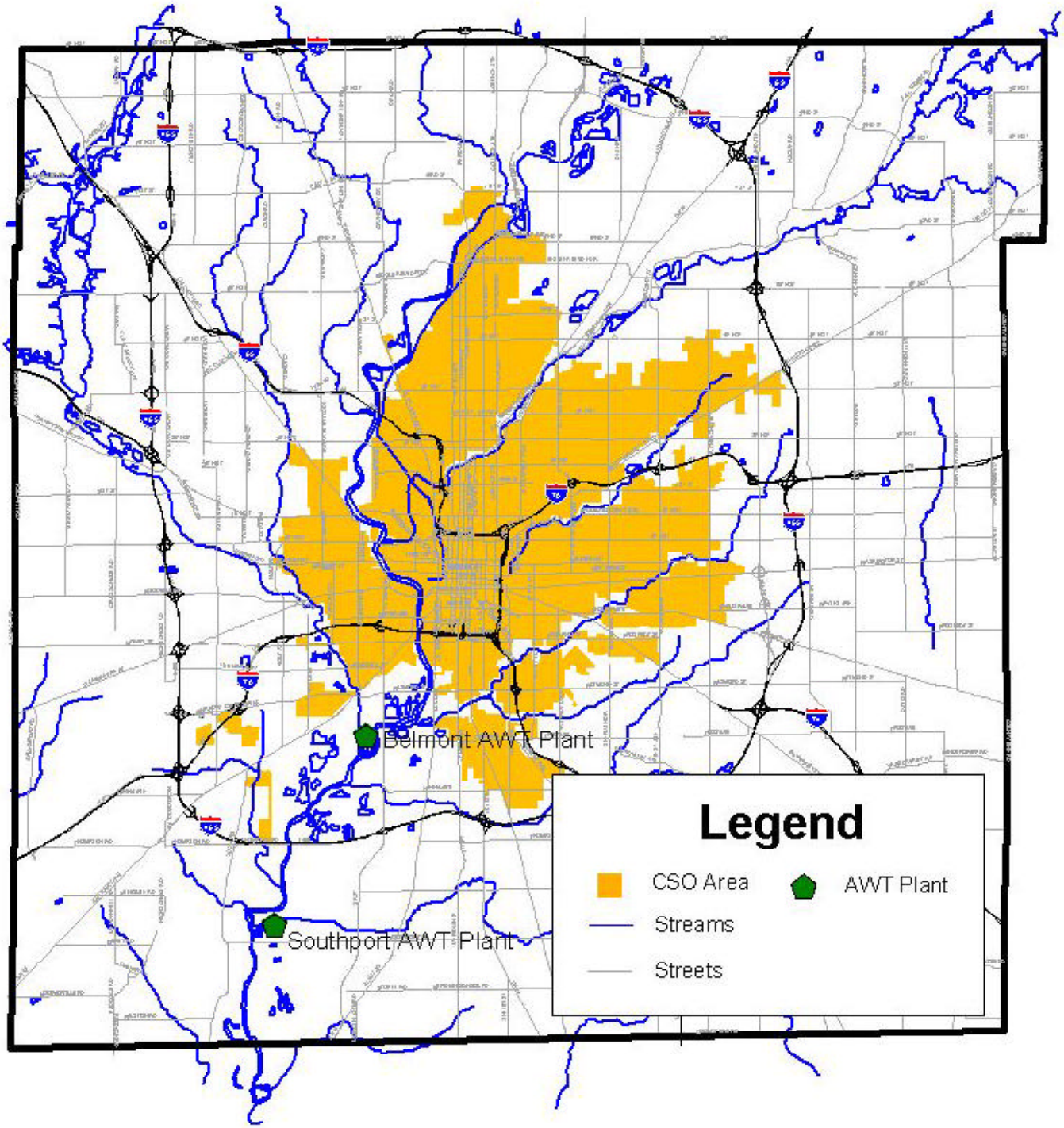

Figure ES-1
Marion County Combined Sewer Area

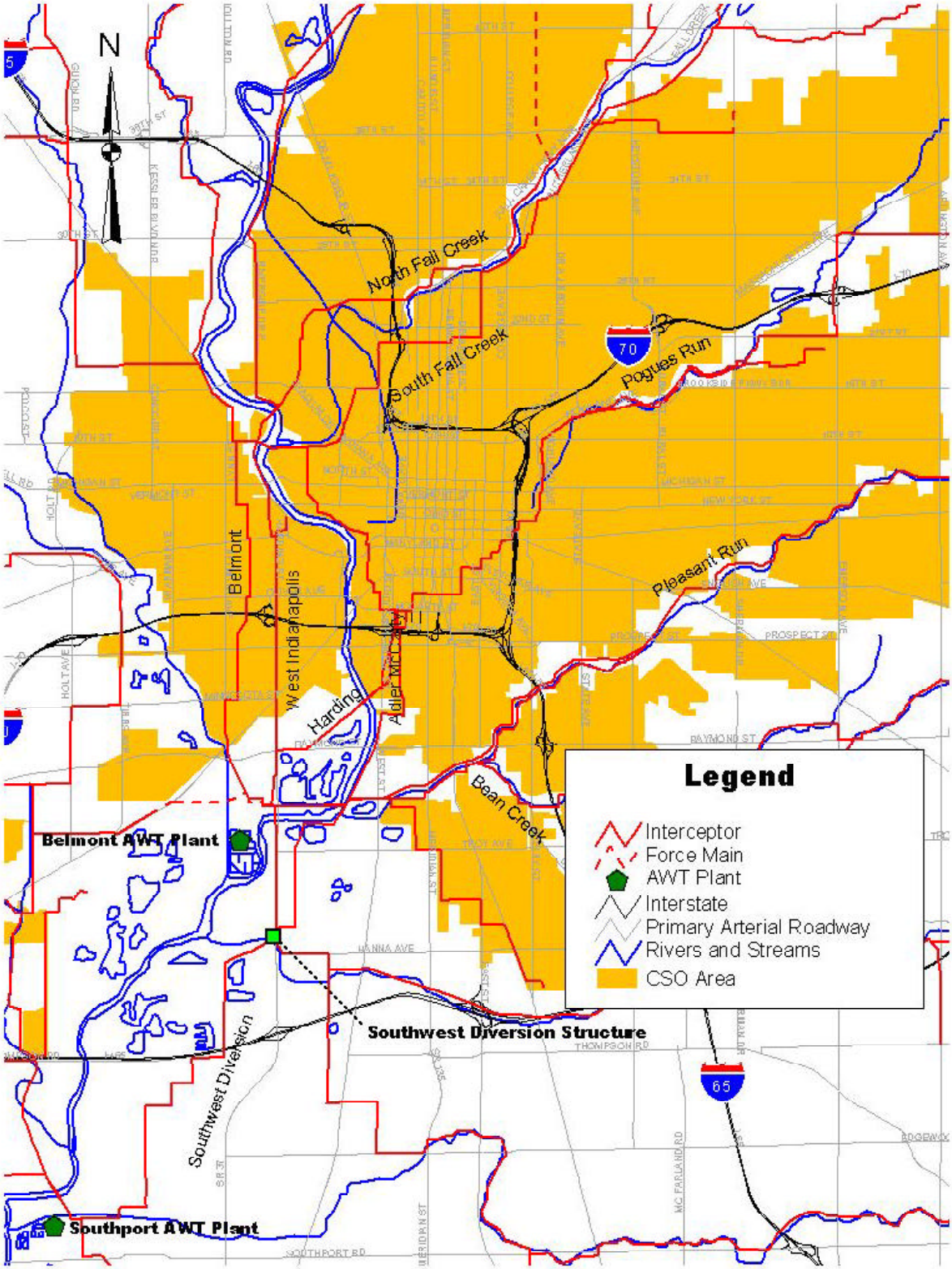

Figure ES-2
Location Map - Combined Sewer Interceptor Network

largest collection system in the State of Indiana. **Figure ES-1** presents the location of this combined sewer area along with county boundaries and the two AWT plants, Belmont and Southport, which collect and treat the city's wastewater.

The city's combined sewer interceptor network consists of three main branches: the Pleasant Run/Bean Creek, the Pogues Run, and the South Fall Creek interceptor branches. These three interceptor branches convey flows into a centrally located core interceptor sub-network (which includes Eagle Creek) that, in turn, conveys flows to the two AWT plants. **Figure ES-2** shows the locations and alignment of all three interceptor branches, the core interceptor sub-network, and the Belmont and Southport AWT plants. There are a total of 133 CSOs and 156 CSO regulators currently located within the Indianapolis CSO system.

The core interceptor sub-network includes 36.7 miles of interceptor sewers, 44 regulators with 8,337 acres of tributary area, and two pump stations. Land use is predominantly industrial, with flows discharging directly to the interceptor (directly connected without regulators), and low- to very low-density residential. This sub-network is comprised of the Belmont, West Indianapolis, Southwest Diversion, and Adler-McCarty interceptors, and conveys wastewater from the three combined interceptor branches described above (as well as from the northern portions of the separate sewer area) to the Belmont and Southport AWT plants.

The Pleasant Run/Bean Creek interceptor branch, located on the southeastern portion of the network, contains 16.1 miles of interceptor sewers and 51 regulators. A total of 6,112 acres served by combined sewers drains into this branch; land use is primarily low-density residential. This branch begins at the Adler-McCarty interceptor, which is part of the core sub-network. Pipe diameters in this interceptor branch range from 15 inches to 78 inches.

The Pogues Run interceptor branch is located north of the Pleasant Run/ Bean Creek interceptor and contains 10.4 miles of interceptor and 25 regulators. A total of 5,453 acres of combined sewer area drains into this branch, which is comprised mostly of low- and medium-density residential areas. This branch also begins at the Adler-McCarty interceptor. Pipe diameters in this interceptor branch vary from 15 inches to 66 inches.

The South Fall Creek interceptor branch is located north of the core interceptor and includes the Fall Creek interceptor. This branch contains 19 miles of interceptor sewer and 15,192 acres of combined area draining into 36 regulators. Pipe diameters in this interceptor branch vary from 12 inches to 120 inches. Land use is predominantly low- to very low-density residential.

Wastewater is diverted from the combined sewer system to the existing interceptor sewer system at 156 regulator diversion locations; the distribution of these regulator diversions is shown in **Table ES-1**.

During rainfall events, the combined sewer system serving this area overflows at 133 combined sewer outfall locations into the White River and several of its tributaries, distributed as shown in **Table ES-2**. In some cases, especially along Fall Creek, multiple regulator structures exist upstream of the outfall. Thus, the number of regulators (156) exceeds the number of outfalls (133).

The city provides sewer service for six other cities or districts. These include:

- City of Greenwood
- Ben Davis Conservancy District

Table ES-1
Regulator Diversion Locations

Interceptor Sub-Network	Number of Regulators
Pleasant Run	52
Fall Creek	37
Central Sub-Network*	52
Pogues Run	27
Total	168
*Including State Ditch, Eagle Creek, Lick Creek	

- City of Lawrence
- City of Beech Grove
- Tri-County Conservancy District
- Boone County Utility

The contracts with these agencies all include provisions for exclusion of clearwater from entering the system.

ES-3 Contract Operator

On January 1, 1998, the City of Indianapolis Department of Public Works entered into a 10-year contract with the White River Environmental Partnership (WREP) for the operation and maintenance of the city's storm and wastewater collection system, advanced wastewater treatment plants, and Eagle Creek dam. Under the contract, the city retains ownership of the storm and wastewater infrastructure, but utilizes a contractor with specialized professional skills and extensive experience to maximize efficient operations and maintenance.

The contract between the city and WREP specifies that WREP has the right and responsibility, within the parameters of city policies and budgets and applicable legal requirements, to carry out its obligations in the safest, best and most cost-efficient manner, according to its best professional judgment. WREP provides all personnel, materials, inventory, utilities and services required to operate and maintain the treatment plants, collection system and dam. WREP is also responsible – either wholly or in part – for operation of the following minimum controls:

- Operation and maintenance activities in the collection system,
- Maximization of in-system storage,
- Industrial pretreatment program,
- Maximization of flow to the AWT facilities,
- Prevention of dry-weather discharges,
- Control of floatable and solid materials,
- CSO monitoring and sampling.

A complete description of each of these minimum controls is provided in Section 3 of this report.

Table ES-2
CSO Locations

Receiving Stream	Number of Outfalls
Pleasant Run	49
Bean Creek	3
Fall Creek	27
Central Sub-Network (White River)	23
Pogues Run	23
Big Eagle Creek	4
State Ditch	2
Little Eagle Creek	1
Buck Creek	1
Lick Creek	1
Total	134

ES-4 Overview of CSO Operational Plan

Introduction

There are two key objectives of both the EPA CSO policy and the Indiana CSO strategy: (1) the implementation of the Nine Minimum Controls; and (2) the development and implementation of a long-term control plan (LTCP). The Nine Minimum Controls represent low-cost, technology-based actions or measures that can help reduce CSO pollutant discharges and their effects on receiving water quality. These controls, as defined by the Indiana CSO strategy, include:

1. Review of operation and maintenance programs;
2. Maximum use of the collection system for storage;
3. Review and modification of pretreatment programs;
4. Maximize flows to publicly owned treatment works (POTW);
5. Prohibit CSO discharges during dry weather;
6. Control of the discharge of solid and floatable materials;
7. Pollution prevention programs;
8. Public notification;
9. Monitoring.

The nine measures are recognized by EPA as minimum technology-based limitations for CSO permits to meet minimum Best Conventional Technology/Best Available Technology (BCT/BAT) requirements on a best professional judgement (BPJ) basis. Indianapolis has done the following to comply with the regulatory requirements.

Minimum Control No. 1 - Operation and Maintenance

Both the state and federal CSO guidelines require cities to implement programs focused on the proper operation and maintenance of the wastewater collection system. The City of Indianapolis has a program in place to document its inspection and maintenance of the combined sewer system and its related facilities. The goals of the existing DPW sewer maintenance and clearwater reduction programs are to identify potential modifications that might reduce CSO impacts. The objectives of the sewer maintenance and clearwater reduction programs in the context of the CSO Operational Plan are:

1) To ensure that discharges at combined sewer outfalls do not occur during dry weather;

2) To maximize the use of the existing interceptor sewer system to capture wet-weather combined sewer flows for treatment; and,

3) Where possible and cost-effective, to reduce the concentration and/or mass of CSO pollutants (including solid and floatable materials) discharged during wet weather.

To fulfill these objectives, the city has developed the following programs and activities:

- **Regulator and Outfall Inspection and Cleaning:** DPW's current program of daily inspection of the regulators and outfall flap gates will be maintained. Any accumulated debris will continue to be removed from the regulator and/or from the flap gate.

- **Catch Basin Cleaning:** A program for catch basin maintenance was developed by WREP. The cleaning and maintenance of catch basins shall continue as part of WREP's yearly structural cleaning requirements. Quantities of solids removed from these structures will be tracked to assist in determining the effectiveness of this program in reducing CSO impacts.

- **Sanitary Sewer Infiltration/Inflow (I/I) Control:** The city's current program for I/I analysis and control will be maintained. The benefits of reducing the I/I flows to interceptors that serve the combined sewer area will be included in the cost-effectiveness evaluations for planning I/I control projects.

- **Infiltration Control for Interceptor Sewers:** DPW's current and proposed infiltration and structural assessment work will be coordinated with CSO control projects (especially interceptor sewer improvements) to identify and correct any locations where significant clearwater infiltration is observed.

- **Inspection and Cleaning of Interceptor Sewers:** DPW's current and proposed inspection and structural assessment work will identify any locations where significant solids deposition may be occurring in the interceptor system. If the hydraulic capacity has become significantly restricted, the sewer will be cleaned, where feasible and cost-effective. This work will be coordinated with the CSO Operational Plan and computer models of the interceptor sewer system to evaluate the impact of any observed deposition problems. This information will be used to assess the cost-effectiveness of cleaning any segments of the interceptor sewer system that may be impacted by solids deposition.

Finally, the city has enacted and enforces a sewer use ordinance which prohibits the entry of clearwater into the sanitary sewer system. This ordinance serves the objectives of the CSO program in effectively the same manner as the capital programs to mitigate I/I noted above. The city has initiated the process of revising its Sewer Use Ordinance to: (1) explicitly include provisions to prohibit the construction of new combined sew-

ers; (2) require new tributaries to the combined sewers be designed to minimize or delay inflow to the combined sewer; and (3) require separate inflow/clearwater and sanitary connections to a combined sewer to facilitate the disconnection of the former if a separate sewer becomes available.

Minimum Control No. 2 - Collection System Storage

The city identified 51 early action projects for CSO control. Total cost of all projects is estimated at $143.5 million. The updated CSO Operational Plan indicates the progress that the city has made by completing 24 projects identified in the 1995 CSO Operational Plan and also identifying and completing the seven additional projects at a cost of $8.9 million. In addition, the city is working on 19 projects at a cost of $116.6 million and has identified eight future projects at a cost of $18 million. The goal for all these projects is to reduce the number of CSOs. In-system storage is a viable approach for reducing the volume of CSO discharges to receiving streams. To determine the potential effectiveness of this technique, the city reviewed all CSO outfalls greater than 36 inches. From this review, the city determined that 19 million gallons of in-system storage could be achieved cost-effectively if those outfalls greater than 72 inches were retrofitted with in-system storage devices such as mechanical sluice gates or inflatable dams.

The cost of implementing in-system storage might be considerably less than the marginal cost of adding additional storage to any new facilities that may be constructed. The above analysis indicates that under virtually any long-term planning scenario, in-system storage devices can be expected to prove cost-effective. However, there are risks involved with implementing such a program. In the worst-case scenario, a control strategy of this nature can endanger the general health and safety of the community if it is improperly designed, inadequately maintained, or malfunctions. These risks must be considered and have been evaluated by implementing a pilot in-system combined sewer storage program.

The City of Indianapolis has begun implementing a number of in-line and Real-Time Control (RTC) storage projects to increase system storage and reduce CSO impacts. Among these are several inflatable dam installations along Fall Creek. A Fall Creek in-system storage investigation completed in October 1999 prompted the city to develop plans for inflatable dams at CSOs 063, 063A, 065, and 101. A RTC study is currently underway to identify additional RTC facilities that could be placed in the collection system. The RTC study will include the design of three inflatable dams and three pinch valves to be completed in 2003. The inflatable dams will be installed at CSOs 080, 084 and 118. Pinch valves are to be installed to manage sewer interceptor flows and maximize flow to the Belmont and Southport AWT plants.

Minimum Control No. 3 - Pretreatment Program

Since Indianapolis began its industrial pretreatment program in 1985, it has recorded substantial improvement in the quality of industrial wastewater discharged to the municipal sewer system. The city has analyzed industrial impacts on water quality in Marion County. During preparation of the LTCP, the city also characterized the potential toxicity in the wastestream of significant industrial users (SIU). This theoretical information is limited, but will be useful for identifying specific CSOs and prioritizing stream segments that theoretically might be impacted by the toxics potentially discharged at the CSOs.

Indianapolis has evaluated a number of alternatives for mitigating the impact of CSO discharges containing industrial wastewaters. These alternatives include:

- Decreasing flow during wet weather events,
- Holding all flows during wet weather events,
- Diverting strong flows during wet weather events,
- Eliminating clearwater flows,
- Reducing or eliminating wastewater flows,
- Upgrading pretreatment equipment,
- Revising pretreatment limits,
- Implementing voluntary proactive programs,
- Increasing sewer discharge fees, and
- Requiring stormwater permits in the combined sewer area.

In addition, it may be necessary to develop and promulgate specific toxic pollutant limitations for those industries with discharges to CSO structures. In either case, the city will address toxic pollutants at the source or in the planning of CSO projects. The city plans to continue to work with the Industrial Dischargers Advisory Committee (IDAC) or individual industries on any modifications to its pretreatment program.

Minimum Control No. 4 - Maximization of Flow to AWT Facilities

To reduce CSO impacts from the city's combined sewer areas, Best Management Practice (BMP) controls must be integrated with cost-effective capital improvements to provide:

- Increased capture and conveyance of combined sewer flows by the interceptors by optimizing the wet-weather hydraulic performance of these sewers; and
- Treatment of those flows to the greatest extent practical at the city's AWT facilities.

A hydraulic model of the city's major combined interceptor systems (Pleasant Run, Pogues Run, Fall Creek, and the central sub-network) was developed to facilitate evaluation and optimization of existing wastewater collection facilities. Sections 3.5.3 and 3.5.4 discuss the model development and calibration process. A number of system improvements were recommended in the 1995 CSO Operational Plan, and design of these improvements was completed in July 1995. The Phase I Optimization program was completed in 1996. All but two of the projects listed in the 1995 CSO Operational Plan were completed. These two projects were deleted from the program for constructability reasons.

Because interceptor optimization and in-system storage will result in increased flows to the Belmont and Southport AWT facilities, it is necessary to understand the primary treatment capabilities of these facilities. The evaluation of the wet-weather performance of these treatment facilities is presented in Section 3.5.6, and is based on monitoring performed at those locations by the AWT Facilities Process Control Group, and more recently by the city's contract operator for the AWT facilities.

Minimum Control No. 5 - Prevention of Dry-Weather Discharges

The city currently operates an aggressive program of combined sewer system maintenance that includes daily inspection, cleaning (as required) and reporting of the condition of each combined sewer regulator and outfall gate (where installed in the combined sewer system). This program is effective in preventing the development of chronic dry-weather discharge conditions. In the event that unusual circumstances cause the random occurrence of dry-weather discharging, the program ensures that the conditions causing discharge will be promptly identified and eliminated. The city will continue its current program for operation and maintenance of the combined sewer system to prevent dry-weather CSO discharges and the "chalking" program to identify dry- and wet- weather discharges.

Minimum Control No. 6 - Control of Solid And Floatable Materials

The city will continue to control solids and floatable materials through catch basin maintenance and pollution prevention programs. The city has implemented numerous minor structural improvements to the interceptor sewer system to optimize its performance in capturing wet-weather flows from the combined sewer system. These improvements have reduced the discharge of solid and floatable materials to receiving streams, and particularly to the smaller tributaries.

The city continues to operate three pilot projects that specifically address solids and floatables control. One project is an in-line netting project at CSO 149 (749 E. Pleasant Run Parkway, South Drive). The second is an outfall netting project located at CSO 135 (3900 Millersville Road). The third is a swirl concentrator at CSO 045 (White River Parkway, West Drive).

These projects have provided the city with valuable experience in operating technologies for solids and floatables control. Among the parameters evaluated were the weight of material captured, frequency of net replacement, and character of floatables removed.

Minimum Control No. 7 - Pollution Prevention Program

The city has implemented many pollution prevention programs that help minimize CSO impacts. Although it is difficult to calculate precisely the resulting pollutant reductions, the city believes that significant loads to the receiving streams would occur without these measures. The city intends to continue to implement these programs and to improve and enhance them where needed. These programs include:

Street sweeping. The city's street sweeping program cleans many areas, especially some high-profile areas, on a daily basis. Other areas are cleaned weekly. These frequently cleaned areas are generally within the combined sewer area and remove a considerable solids load from the street surface, preventing them from being flushed into the combined sewers.

Solid waste collection and recycling. The city controls litter in the downtown and surrounding area with a dense network of trash receptacles which are emptied as often as twice daily. The city also conducts a special motor oil recycling program to reduce the improper disposal of this material by allowing residents to drop off motor oil at any of 40 locations throughout the county.

Hazardous waste collection. Since 1985 the city has collected hazardous materials from households and small businesses during the event known as "Tox-Away Day." The city has also developed the Tox-Drop program that provides two permanent facilities where these materials can be disposed throughout the year. Participation in these programs expands each year. 450,000 pounds of materials were collected in the past year. The city will open a third permanent site this summer.

Other programs. The city is also addressing pollution prevention through a number of other programs, including changes in the use of herbicide products, vigorously enforced illegal dumping restrictions, bulk refuse disposal pickup, water conservation and other actions.

Minimum Control No. 8 - Public Notification

Under EPA's CSO Control Policy, public notification programs should be designed to ensure that citizens receive adequate notification of CSO occurrences and CSO impacts. Indianapolis has conducted extensive public education efforts to inform citizens about CSOs and their associated health risks. The city also is developing a program to further educate citizens on water quality and has recently implemented a program to notify them of actual or impending CSO occurrences.

Neither the hydrology nor the water quality of Marion County's urban streams are suitable for public swimming and wading. Even without CSOs, stormwater runoff in an urban area carries enough bacteria into streams to cause violations of recreational water quality standards. The abundance of private and city-owned pools and splash areas make these preferred locations for water recreation. Therefore, the city's public notification and education programs emphasize that urban streams are not safe for swimming and full-body recreational activities.

The city's existing warning signs provide continuous and effective public notification of CSO impacts at the locations where people come in contact with the streams and are most affected by CSO health risks. For this reason, the city will continue to support the Marion County Health Department's efforts to maintain CSO health warning signs.

The city also believes that public notification should be part of a broader effort to inform citizens about CSOs, their impacts, and government efforts to address those impacts. Therefore, the city is developing a comprehensive program designed to educate citizens; seek public input; inform neighborhoods about construction projects; notify residents of overflow events; and report on the city's progress in reducing CSOs and improving water quality.

Finally, in accordance with IDEM requirements, the city has developed and implemented a public notification program to alert citizens when potential CSO overflows may occur. This program utilizes e-mail and establishment of an overflow warning "hotline." This program is outlined in Appendix D.

Minimum Control No. 9 - CSO Monitoring and Sampling

U.S. EPA and IDEM require cities to set up a monitoring program during and after implementation of the LTCP. Pursuant to these requirements, the City of Indianapolis described a proposed compliance monitoring program in its April 30, 2001, LTCP. The plan included a map of monitoring stations, a record of the frequency of sampling at each station, a list of data to be collected, and a quality assurance/quality control plan.

The city proposed to use dissolved oxygen and bacteria levels as measures to assess the impact of CSO controls. Indianapolis plans to use a combination of the SWMM, STORM, and WASP models to evaluate the effectiveness of LTCP controls and to fine-tune planning and implementation of specific CSO control projects. The models will be updated to reflect the sewer system and AWT plant improvements and recalibrated throughout the LTCP implementation period. This will allow the city to determine how various scenarios might affect evolving management and control strategies along Indianapolis streams.

The city has developed a *Supplemental Flow Monitoring and Sampling and Analysis Program (SAP) for Combined Sewer Overflows.* The SAP includes the following objectives:

1. Confirm Model for Flow and Volume
2. Confirm Dissolved Oxygen Control
3. Confirm Bacteria Control
4. Confirm Location of Industrial Users (IU)
5. Confirm Industrial User Discharge Characteristics
6. Continuing Model Verification and Adaptability

The activities presented in the SAP are designed to expand and support the city's existing database. The data collected have allowed the city to refine the CSO model and better evaluate control options during the facility planning process.

In addition, the city will review the LTCP and CSO Operational Plan as required, and update as necessary to document the results of post-construction monitoring along CSO receiving streams. As the city updates the LTCP and CSO Operational Plan, it will revisit the compliance monitoring plan and modify the sampling parameters and frequency as needed.

ES-5 Conclusions

The city's CSO program has made significant progress in implementing minimum technology controls to mitigate CSO impacts. The city's operation and maintenance practices have been successful in virtually eliminating dry-weather overflows, and they are effective in controlling to a significant extent the discharge of solid and floatable materials. The city's pretreatment program is effective in controlling the discharge of pollutants from industrial sources, and industrial discharge locations have been correlated to CSO outfall points to support efforts to further reduce wet-weather industrial discharges, especially at specific receiving stream locations. The city manages and actively promotes many programs that support pollution prevention approaches to CSO mitigation, including street sweeping, litter control, solid and hazardous waste collection, recycling and other programs. Public notification of the potential health risks associated with contact with CSO-impacted receiving streams is being accomplished with a network of public health warning signs placed throughout the CSO area for many years and a new public notification program that was implemented in 2002.

The city also has developed and further refined a hydraulic model of the city's combined interceptor sewer system and a water quality model of the Indianapolis waterways. The hydraulic model has enabled the city to increase the capture of combined sewer flows by identifying specific modifications that have been installed in the existing wastewater collection system to reduce CSO impacts from the city's combined sewer area. The water quality model was developed to analyze the impacts of implementing various CSO controls on dissolved oxygen and bacteria concentrations in Indianapolis waterways.

Looking to the future, the city will continue to implement its operation and maintenance programs to prevent dry-weather overflows, to maximize combined sewer flow capture and to capture as much solid and floatable material prior to discharge as possible. The continued and possibly expanded use of alternate control techniques is also being evaluated.

In addition to completing the current construction program to maximize combined sewer flow capture and treatment, the city also intends to implement other minimum technology controls to address CSOs.

ES-6 Operational Plan Organization

This CSO Operational Plan has been organized into four sections, as follows:

ES Executive Summary

1.0 Introduction: Briefly describes the objectives of the CSO Operational Plan.

2.0 CSO System Description and Inventory: Presents a detailed listing of the CSO outfalls and regulator structures, and descriptions of the interceptor sewer system and the combined sewer area that it serves.

3.0 Implementation of the Nine Minimum Controls: Describes the various actions, programs and practices through which the city implements each of the Nine Minimum Controls.